



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,751	11/26/2003	Akihiko Shiina	K06-163744M/TBS	3940
21254	7590	09/09/2005		
MCGINN & GIBB, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817			EXAMINER LUM VANNUCCI, LEE SIN YEE	
			ART UNIT 3611	PAPER NUMBER

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

*Office Action Summary*

Application No.

10/721,751

Applicant(s)

SHIINA ET AL.

Examiner

Lee Lum

Art Unit

3611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12-18 and 20-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-7, 10, 13-18, 21-28, 31 and 32 is/are rejected.
- 7) ☒ Claim(s) 2, 8, 9, 12, 20, 29 and 30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

1. An Amendment was filed 7/7/05 in which Claims 11 and 19 were also cancelled.
2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1, 3, 4, 7, 10, 16-18, 21, 22, 26 and 31** are rejected under 35 U.S.C. 102(b) as being anticipated by Appleyard 6491131.

Appleyard discloses an electric power steering apparatus (fig 1) comprising

Driving gear/worm 13, and driven gear/worm wheel 12,

In which backlash between the two is set at least in a neighborhood region (or, first range of operation) of a steering neutral position region (c1, In 60-66; “driving straight ahead”) as smaller than in a remaining region (or, second range of operation) (i.e., outside the “predetermined range of torque values”),

Wherein the driving gear comprises bias portion 14 that sets the backlash (c6, In 39-40, 50-52, 59-65), and that corresponds to the first range of operation (c6, In 59-63; “in order to prevent gear rattle when driving around the straight ahead”),

and further,

The neighborhood region comprises a steering angular range on each side of the steering neutral position, as provided in c1, In 60-66; “over a predetermined range of torque values...[so] preventing gear rattle when driving straight ahead”,

wherein the remaining region comprises a steering angle that exceeds the steering angular range (c1, In 60-66, because this region is outside the “predetermined range of torque values...when driving straight ahead”),

Art Unit: 3611

Wherein a shaft center of the worm is offset from the worm wheel in an axial direction, via (at least) element 14, and,

The backlash changes gradually between the regions (inherent because the gears are fit, and adjusted, such as by elements 8,9,14, such that backlash is minimized; i.e., the gears correspond closely such that steering is generally smooth between "regions" of operation).

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A. **Claims 5, 6, 27 and 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard.

Re Claims 5 and 27, the reference does not disclose the steering angular range as comprising a substantially equal steering angle on each side of the neutral position. However, this feature would have been obvious in order to provide a steering transition between each side of the neutral position that is generally equally smooth between areas of operation, thus increase driver comfort.

Re Claims 6 and 28, the reference does not disclose the steering angle as comprising about 20 degrees of steering angle, but this feature is clearly application-dependent. The particular angle would be predetermined to achieve desired steering/handling characteristics. In this manner, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include an appropriate steering angle to achieve certain desired steering characteristics.

Art Unit: 3611

**B. Claims 13-15 and 23-25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Higuchi 4475413.

Appleyard does not disclose either gear as including a first radius of a pitch circle corresponding to a range of operation that is larger than a second radius corresponding to a remaining region. Higuchi shows this configuration in fig 2 with

Driving gear 10 having teeth 10a-10f with different pitch circles with respective correspondance, and as disclosed in c3, ln 14-39.

It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Higuchi, to provide certain steering characteristics for a particular application.

**C. Claim 32** is rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Kojo et al 6041887.

Appleyard does not disclose a motor with variable power assist, while Kojo shows motor 24 as controlled to output variable power assist, according to the range of operation (i.e., of the steering wheel), as provided in c5, ln 24-34, ln 52-56, c6, ln 53-63, etc). It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Kojo, to provide improved steering handling, thus increase driver comfort. This feature is well-known for this objective.

**4. Claims 2, 8, 9, 12, 20, 29 and 30** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Prior art does not disclose the invention described above further including, *inter alia*, the driven gear as including a bias portion on its outer teeth.

5. RESPONSE TO REMARKS

Examiner reiterates her rejections using Appleyard, and in view of Higuchi, etc, as obviating the respective elements.

In response to remarks re Appleyard, the reference is maintained as obviating “[either] the driving gear/driven gear *[having] a bias portion that sets the backlash*” (emphasis added) – Claims 1 and 16.

Appleyard clearly discloses bias 14 that

“acts to bias the worm (i.e., driving gear; c6, ln 50-55)...and allow it to adopt a fully meshed condition [with the driven gear]...in order to prevent gear rattle [i.e., backlash] when driving around the straight ahead” (c6, ln 59-63; i.e., steering neutral position).

In this manner, the reference obviates this limitation, and clearly negates arguments raised by the Applicant (p11), including that in Appleyard, “backlash does not change relative to steering position”, and “is entirely dependent on torque”.

It is noted that the language “sets the backlash” is very broad, to say the least, as is “comprises a bias portion”. Therefore, Appleyard is construed to read on this limitation.

Applicant’s arguments re Bucholtz have been considered, and rejections using this reference have been withdrawn.

Applicant’s arguments re Higuchi are maintained for Claims 13-15 and 23-25 because the reference is pertinent to limitations re “pitch circles” and “gearing radius”.

Lastly, remarks re Kojo are groundless because it is combined with Appleyard to teach the well-known inclusion of “variable power assist”, and not any other limitation. Applicant is apparently rendering a piecemeal analysis of the reference, while the intent was/is to teach a particular well-known feature, in combination with Appleyard. See *In re Keller*, 208 USPQ 871 (CCPA 1981).

Applicant is asked to note allowable subject matter.

Art Unit: 3611

6. Amendments have necessitated the new grounds of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.02(I)(3). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

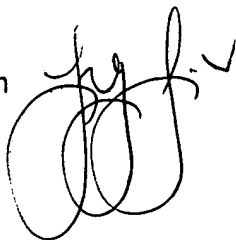
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

7. Communication with USPTO/Examiner

Any inquiry concerning this communication, or others, should be directed to Ms. Lum at 571 272-6649, M-F, 9-5. If attempts to reach the examiner are unsuccessful, her supervisor, Ms. Lesley Morris is at 571 272-6651. Our fax number is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications: private PAIR only, for published applications: private or public PAIR. For more information re PAIR: <http://pair-direct.uspto.gov>. Questions re access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866 217-9197 (toll-free).

Ms. Lee S. Lum  
Examiner  
9/1/05



**LESLEY D. MORRIS**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 3600**